



Systems Engineering for Small and Medium Enterprises

A 2-Day Practical Tutorial

Better Product Design for Better Profitability.

Systems engineering was developed as a way of thinking about large, complex system development. What can it possibly offer to an efficient, product-oriented enterprise? The answer lies in an understanding of what systems engineering really is: a set of thought processes that guide how to think about product development.

Small and medium enterprises (SMEs) today are producing products that are far more capable than ever before. Those products often fit into larger systems with difficult, complex interactions that impact the product design. The most profitable SMEs are drawing the most efficient ideas from the systems engineering methods long used by larger enterprises.

This workshop provides you with a summary of the most efficient methods used by systems engineering, methods that work at the level of SMEs, methods that you can apply now.



Participants in this workshop practice the processes on their own real projects.

You should attend this workshop if you are:

- Developing products in an environment that demands the most efficient methods.
- Project leader or key member in a product development team
- Looking for practical methods to use today

The course is aimed at

- SME engineering principals,
 - Project leaders,
 - Technical team leaders,
 - Design engineers, and
 - Others who participate in product design.
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Topics Covered in the Course

Why Systems Engineering? – Real examples that show the efficiency obtained with systems engineering. Quantified results that indicate the Return on Investment (ROI). An underlying process model that ties together all the concepts and methods. Importance of considering more than just “process,” including also methods, skills, and knowledge. How to take the pragmatic view to obtain the best benefits for an SME.

SE Tools for SMEs – Survey of SE thought processes and tools that can apply and work well in the rapid development environment. (In a broad sense, “tools” include processes, methods, skills, and knowledge.)

Agreement Tools – Tools that help to reach agreement on the product purpose and operation. Identification of stakeholders to focus the agreement. Concept of operations as a definition tool. Measures of effectiveness as a quantification of product worth. Objective Function as a trade-off tool. How to measure system quality. Analyzing missions and environments

Requirements Tools – Tools that help to define and improve the technical specifications for the system product, so that development proceeds in a known direction. Product specifications as a development tool. Operational analysis as a means to convert operational concepts into technical definitions. Requirements analysis as a tool to improve the technical definition. Functional Flow Block Diagrams. Use Case and Activity diagrams. UML and SysML.

Solution Definition Tools – Tools that help to architect the product system. What is an architecture? System architecting processes; defining alternative concepts; alternate sources for solutions; how to allocate requirements to the system components; how to develop, analyze, and test alternatives. Alternatives analysis using the Objective Function. System architecting methods and concepts. Design patterns and their use in architecting. Interface management as a control tool.

Technical Evaluation Tools – Tools that help to ensure product quality. Building in quality during the development, and then checking it frequently. The relationship between systems engineering and systems testing. System integration purpose and methods. . Verification at multiple levels: architecture, design, product. Validation at multiple levels; requirements, operations design, product.

Technical Management Tools – Tools that help the small development team to work effectively together. Planning the technical processes; assessing and controlling the technical processes, with corrective actions; use of risk management, configuration management, interface management to guide the technical development. The original Integrated Product Team (IPT) concept and how it applies well to small teams. Technical Performance Measurement (TPM) as a management process to guide the team. Milestones and their effectiveness in coordinating development. How to guide and motivate technical teams; technical teamwork and leadership; virtual, collaborative teams; design reviews; technical performance measurement.

Our Qualified Instructors

Dr. Eric Honour, CSEP, INCOSE Fellow, and former INCOSE President, has been in international leadership of the engineering of systems for two decades, part of a 40+ year career of complex systems development and operation. His energetic and informative presentation style actively involves class participants. He was the founding Chair of the INCOSE Technical Board in 1994, and served as Director of the Systems Engineering Center of Excellence (SECOE). He is on the editorial board for *Systems Engineering*. He has been a successful entrepreneur, systems engineer, engineering manager, and program manager at Harris , E-Systems, and Link, and was a Navy pilot. He has led or contributed to the development of 17 major systems, including Air Combat Maneuvering Instrumentation, Battle Group Passive Horizon Extension System, and National Crime Information Center. BSSE (Systems Engineering) from US Naval Academy, MSEE from Naval Postgraduate School, PhD from University of South Australia based on his ground-breaking work to quantify the value of systems engineering.



Mr. Glen Francisco (CSEP, PMP) has over 17 years of experience developing new technologies, service, products, and applications for both private and government uses. He has a personable, engaging teaching style that keeps a class alive with information. He has worked as an engineer, Lead Systems Engineer, Project Engineer and Program Manager for a number of military & commercial companies to include Boeing (McDonnell Aircraft Company), Lockheed Martin (Martin Marietta), Texas Instruments, Raytheon, ELCAN Optical and DRS Technologies. His product systems have supported security surveillance, paramilitary (fire, police & EMS), automotive and industrial markets using passive thermal imaging technologies and other wavelength illuminated electro-optical imaging laser radar technologies. Glen has presented over a dozen papers at security & defense symposium. He holds multiple patents in active terminal guidance missile trajectory control and low cost plastic thermal management. He developed & introduced Thermal Imaging Cameras into the firefighting market in 2001, technology saving hundreds of lives and millions of dollars in property.

